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Vipan Kumar Sharma

*Asstt. Librarian, Jaypee University of Information Technology, Waknaghat, Solan, Himachal Pradesh – 173 234 (INDIA).*, [vipin.sharma@juit.ac.in](mailto:vipin.sharma@juit.ac.in)

Suresh Kumar Chauhan

*Deputy Librarian, Jaypee University of Information Technology, Waknaghat, Solan, Himachal Pradesh – 173 234 (INDIA).*, [suresh.kumar@juit.ac.in](mailto:suresh.kumar@juit.ac.in)

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# Digital Library Challenges and Opportunities: An Overview

Vipan Kumar\* and Suresh Kumar\*\*

\*Assistant Librarian, Jaypee University of Information Technology, Wahnaghat, Solan, Himachal Pradesh – 173 234 (INDIA).  
Cell No. +91 9805481416 Email: vipin.sharma@juit.ac.in

\*\*Deputy Librarian, Jaypee University of Information Technology, Wahnaghat, Solan, Himachal Pradesh – 173 234 (INDIA).  
Cell No. +91 9555626161 Email: suresh.kumar@juit.ac.in

## Abstract:

Libraries have been long been endless sources of information for users. The face of libraries is changing as content is moving toward a digital platform and internet access is becoming more of human necessity than a privilege, which got influenced by technology. New technology has given rise to a new concept of modernization of academic libraries using digital technology and now going to become a part of daily work culture of under-developed the scenario. This paper also examines some of these challenges and opportunities in context to academic libraries. Digital library is an innovative technology to develop the learning and new required skills for professionals to cope with digital libraries.

**Keywords:** Digital Library, Academic Library, Library Professionals ICT, Digital Technology

## Introduction:

Today's library professionals continued play a significant role in the libraries to give better services to their users to grow the research output. The new technologies have changed the way of library services and professionals skills to do routine work easily. Now, library professional used these technologies to get, conserve and offer the reference services to its users. The shift from print to electronic or digital has been well observed and recognized globally.

The digital library is an online database of texts, still images, audio, video and other documents in digital media formats. In addition to storage, digital library allow for organizing, searching and retrieving the contents. In digital library, the digital content may be stored and accessed locally and distantly through computer networks. Institutional repositories (IR) archives and digital library are needs of present scenario. Library users need the information which is preserved for research and academic purpose. New technologies develop and influenced the betterment of academic libraries and users. Digitalization has become an integrated part and routine work of the libraries and library professional [Fabunmi, Paris and Febunni 2006]. It gives development of library activities, standardization, communication facilities, housekeeping operations to growing the variety of information needs of the end users [Anuradha P. 2017].

Digital library can be considered as a modern type of information retrieval systems. It is considered virtual because the collections are stored in digital formats and accessible over computers or mobiles anytime anywhere. Such features of library defined and interchangeably used as 'virtual library', 'electronic library', 'institutional repository', 'library without walls', 'digital library' etc. The most appropriate and accepted word to such libraries is 'Digital Library'. It makes definition of digital library more confusing. Seadle and Greifeneder (2007) highlighted one of the best digital library definitions given by the National Science Foundation (NSF), USA in 1999. NSF defines digital library as, "store materials in electronic format and manipulate large collection of those materials effectively". Cleveland (1998) defined digital library is as "World Wide Web". He supported his definition by the large number of documents being gathered by Web and that can be searched.

Layman (2017) enforced to treat digital library, cyber space and information technology as important aspects of library development. He specified role of digital libraries is the key to achieve holistic development in information oriented globalization. Broadly, following are the main objectives of a digital library.

## Objectives of the Digital Library:

Information technology has changed the way of library services, such as identify, processed, procured, retrievals, dissemination to its users. Digital technology has a produced intellect of necessity amongst the users and professionals as well. It has transit information sources systems and services from paper works to electronic services, information explosion, searching problem in traditional libraries, solve the space problem, reduce the cost of technology, improve the quality of information and save the times of the users. Broadly, digital library has following core objectives.

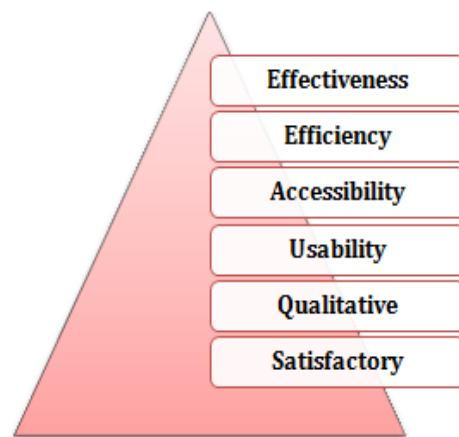
- Storage and preservation of information
- Retrieval of stored information
- Use of digital technology in libraries
- Users interactions with digital materials

- Use of electronics resources and library services
- Digital environment in academic libraries
- Library professional practices and interactions with library users.
- Future of academic libraries and academic librarianship

### **Academic libraries in digital age:**

The library services are more frequently being used by students, research scholars and faculty members. The digital library services have been providing great opportunities to serve the users who represent the growth and development of any academic institution. Libraries are an integral part of any education system and libraries known as repositories of knowledge (Mahajan 2005). Most of quality research is being carried out in universities, therefore, academic libraries need to be remained up to date and bring innovation for serving users. In digital age academic libraries has a significant role to play in information sharing. Nowadays, libraries are not a stockpile of collection but they have changed service orientation from analogue to digital. Now libraries have automated systems to support smooth access of library collection through OPAC (online public access catalogue) systems. Academic libraries have main objective to disseminate the knowledge to give best services to its users. The libraries have been upgrading their services to provide quality literature in the formats convenient to users [Pandey and Misra 2014]. Academic libraries have been focusing on enhancing the value of library resources, services, teaching, and research to help in improving the academic status of their respective institute. The libraries are effectively addressing information needs of users by effectiveness, efficiency, accessibility of resources, observing usability of library system, analyzing usage qualitatively to assess satisfaction on library system [Brindley 2009]. Therefore, it is essential to accommodate following components, highlighted in Fig.1, while creating any digital library.

- Effectiveness: This component is mainly for collection of documents that need to be hosted. The documents which are required and important for the users can only be digitized and uploaded in the digital library.
- Efficiency: It focuses on indexing of the document that helps in search.
- Accessibility: Accessibility of digital library over Intranet or on the Internet. How users are going to access the digital library (login ID)? There should not be any limitation of access to authorized user.
- Usability: The interface of the digital library should be user friendly and easy to use.
- Qualitative: Quality of the software and quality of information resources etc can be assessed before creating digital library.
- Satisfactory: The creation of digital library should be cost efficient and must satisfy the information needs of users.



**Figure 1: Basic Components to Develop Digital Library**

Shem (2015) mentioned that librarianship has always been concerned to education and how libraries are going to serve academic and research community is one of the biggest challenges of the profession. Since, most of the information is available in digital format; hence, there is a need to develop digital libraries and digital librarians.

### **Library Professionals in digital age:**

Digital information environment has become a part of our daily routine of professional activities. The libraries are offering access to e-resources and users' explore and access their needed information resources anytime, anywhere from anyplace during 24x7.

Librarian and library professional should have various technological skills to provide better services and information to the users. Since, use of technology has increased in libraries the library professionals have a responsibility towards promoting information literacy among users [Kulkarni 2014]. Library professionals who are not willing to learn modern technologies must justify their existence as the basic concept of quality management is to be applied to library and information services units with success. Performance, responsibility and control are essential for success of library systems and information centers.

Library professionals can teach and guide their users how to use digital materials, such as OPAC-Online catalogue of the library for search the documents, how to retrieve the information, how to use e-resources, e-books, etc. In digital age, library professionals are facing many challenges to redefine their role and also to redesign the provision of information services. In digital age, library professionals are expected to play an essential responsibility to transform the needs of information for community. Traditionally professionals have often organized and classified information in such a way that they can find the information on behalf of the users [Bhattacharya P. 2013]. Secondly, librarian and professionals has fulfilled physical role of adviser, interpreter and mediator for user's Information needs. The professionals should embrace the entire new information cycle form creation; restructuring and representation of information to its dissemination and use. Therefore, there is a need to redefine their role and also to redesign information services as per information needs of users. The librarians have to gear up to face the demand and challenges of information users. As specified by Karmakar (2018), this could be done only through fundamental rethinking and radical redesigning of library processes to achieve dramatic improvements in critical contemporary measures of performance of librarian and professionals. Kaur (2015) specified that generation, dissemination, preservation and curation of knowledge in today's digital world present a list of opportunities to librarians to handle information digitally. The digital information needs digital tools and expert skills to manage it for the current and future generation of users. Therefore, skilled manpower is required to handle digital library and its services.

#### **Opportunities and challenges for academic libraries in digital age:**

In digital environment there are so many tools which digital library can be made through networks to operations, such as e-mails, news groups, mailing list, web form, bulletin board, SMS, chat, video conferences, virtual world. For digital libraries establishing different hardware such as Workstation, Network, Power Backup, Storage Devices and software such as Dspace, Greenstone, Fedora, E-Print etc, are required to integrate for deployment to access vast numbers of collection in digital form. The technical aspect has become more important and highly critical as whole digital library get built upon software that fulfilled all objectives of digital library project. Conclaves and others (2007) mentioned that a good digital library is based on 5S, i.e. Steams, Structures, Spaces, Scenarios and Societies. They proposed a quality model of digital library by mentioning quality indicators enveloped by Digital Library concepts. Table 1 highlights broad areas of opportunities and challenges of digital libraries.

**Table 1 – Digital libraries – opportunities and challenges**

Opportunities	Challenges
Libraries are becoming technology hubs	Demonstrating the value of libraries
Expanded access through information sharing	Preserving the material on a digital scale
Libraries have strong role in the communities	Making services engaging to users
Libraries are being shaped by cuts the budget	Subject matter expertise
Printed materials still dominate reading, despite the growth of contents.	Becoming familiar with wide range of digital contents.

#### **Information retrieval:**

According to Fox, Goncalves and Kipp (2002) the information retrieval (IR) is the core issue for the success of any digital library. They further stated that indexing code is also essential for retrieval of information. Therefore, evaluation of any digital library with respect to its utilization from the side of users must be regularly done. Gella Okojie and Olaniyi (2018) stressed upon using semantic web and social networking technologies to improve the utilization of digital libraries. According to them the bookmarking facility in digital library can bring impactful changes in the world of digital libraries.

#### **Planning:**

The Digital Library involves a huge investment for digitization of their existing collection and acquisition of Digital resources [Bhattacharya P. 2013]. There are many issues (challenges) that need to be addressed while developing any digital library. Figure 2, highlights some of the core challenges that should be properly assessed before developing a digital library. The library professionals have to identify what are the objectives of developing digital libraries, which software will be most suited to the objectives, what are the resources that need to digitize, what are the technical aspects of software to provide seamless access of digital library and how one can secure the content uploaded in digital library? The library professionals should be aware about the copyright (IPR) issues involved in digitization of content and must understand the user friendly aspect of digital library with respect to its accessibility.



**Figure 2: Challenges to Develop Digital Library**

Accessibility:

Users may face many hindrances while accessing digital library. These hindrances could be because of information overload, poorly designed interface, misleading information provided by the digital library or inability to access the digital resources. Due to explosive growth of information the collection of digital libraries is growing in each passing minute. It is more confusing to retrieve, relevant piece of data from this huge information storage, and the other hand no search engine can index whole information of the web to retrieve particular data. It has become a challenging task to user to retrieve his/her needed data or document. Most of the publishers are providing their contents online and users may have option to access the full-text of their need by paying some amount. At this stage, user needs librarian's help to obtain the required information. Due to existing budgetary constraints in the libraries, it is very difficult to access online fee-based repository information. Specially, in developing countries, libraries are discouraged to access those information due to the high cost involved on that. Therefore, budgetary constraints can limit users to access the relevant scholarly communication. Therefore, libraries need to address this challenge to facilitate users with pin-pointed information by developing coordination or policy to subscribe resources at any point of time.

Preservation and conversion of information:

Sharma and Vishwanathan (2001) highlighted some challenges being faced while creating digital libraries. Some of these challenges are conversion from tradition to digital, maintenance of tools involved in digitization process, use of standards, cods and information exchange related protocols, content written in local language or other than English may also place a challenge, prevention of unauthorized use and up-gradation of new technology. Hedstorn (1997) stated that digital preservation presented new set of challenges to the libraries and archives. He further specified that without standards the digital preservation has to face various constraints. Therefore, codes and standards are essential to incorporate before planning any digital library project. Shiri (2003) put across some key challenges associated with digital library creation. One of these was identifying content that need to convert into digital format. Another key issue was use of standards and protocols with respect to digital library architectures, collections, metadata formats, interoperability, indexing etc that are required to create a digital library.

Innovative aspect:

Goodspeed and Khillalia (2019) filed a patent on behalf of Amazon Technologies for working on sharing digital library concept in which user of first digital library can place a request to user of second digital library to use content being used by the second library user and user of second library can also make similar request. In this case one may read or view a portion of the current book or page that a selected person is reading along with any highlights, notes, bookmarks or comments etc. The portion may be 5% of the book would be available to view/read and user needs to purchase the book if he/she wants to read complete book.

Vrana (2017) examined the presence of digital library for e-learning concept has been playing an important role around the globe. He stated that “e-learning is not possible without the learning material and very well supported by the digital libraries as an aid to e-learning”. The digital libraries provide access to quality information resources to students as per their requirement and need. In most of the countries digital libraries are opened to the public that offer many possibilities of formal and informal learning to the public.

#### Assessment or Evaluation:

Adamou and Ntoka (2017) explored the satisfaction level of library users of Panteion University library and TIE of Athens in Greek. They find out that users were more satisfied with the digital collections being available in both the libraries. However, they pointed out that users were not satisfied with the technical infrastructure available to them for accessing online and digital information as well as incompetency of library staff to help them. Saracvic (2000) also highlighted that digital library interests were exploded globally during the 1990s. Many projects were started not only in developed countries but in developing world as well. However, evolution of digital libraries was grooming but limited efforts were made to evaluate projects of digital libraries. He suggested that evaluation of digital library is a key aspect of libraries since it has involvement of manpower, funds and technology. That means, evaluation of digital libraries has become an important part to understand purpose and utilization of any library project. Ball and Bothma (2017) stated that it is not easy for any digital library to use advanced technologies that could provide user friendly searching of needed information. Therefore, it is essential to evaluate digital library with respect to its usability and information literacy.

#### Digital libraries in India:

Borgman (1999) observed that interest in developing digital libraries had become an obsession in many countries during 1990s. Rapid expansion in information technology paved the way to growth of digital libraries. The countries of European Union, UK, USA fueled the research in digital libraries by making national level policies. The conferences, journals and news services on digital libraries were proliferated across the globe. India was not also spared from the mushrooming of digital libraries in the beginning of 21<sup>st</sup> century. Mittal and Mahesh (2008) stated that digital libraries are also known as digital repositories, digital archives, institutional repositories, institutional archives etc. They remarked that status of digital libraries in India also synced with the development of digital libraries in the world. A number of digital libraries and institution repositories were developed in India in recent past. They further highlighted that the creation of digital library needs a suitable software, hardware and contents. In the study they found that a majority of institutional repositories and digital libraries were using DSpace, EPrints and Greenstone software open source software. They also highlighted the Digital Library of India project as the ambitious one that could be considered as a true digital library of India.

Mahesh and Mittal (2008) concerned about the copyright issues involved in digitization process and suggested libraries to address copyright related issues before going for digitization process. Therefore, they further suggested there is a need to amend copyright laws so that digital libraries can openly reach to the end user.

Jain and Babbar (2006) shared that digital library initiatives in India are still in embryonic stage.

Trivedi (2010) was the second to highlight experimental stage of digital library initiatives in India. He stated that Health Education Library for People (HELP), Tata Institute of Fundamental Research (TIFR), IIT Kharagpur and National Centre for Science Information (NCSI) were the institute that developed digital library and provided access to bibliographical details of content.

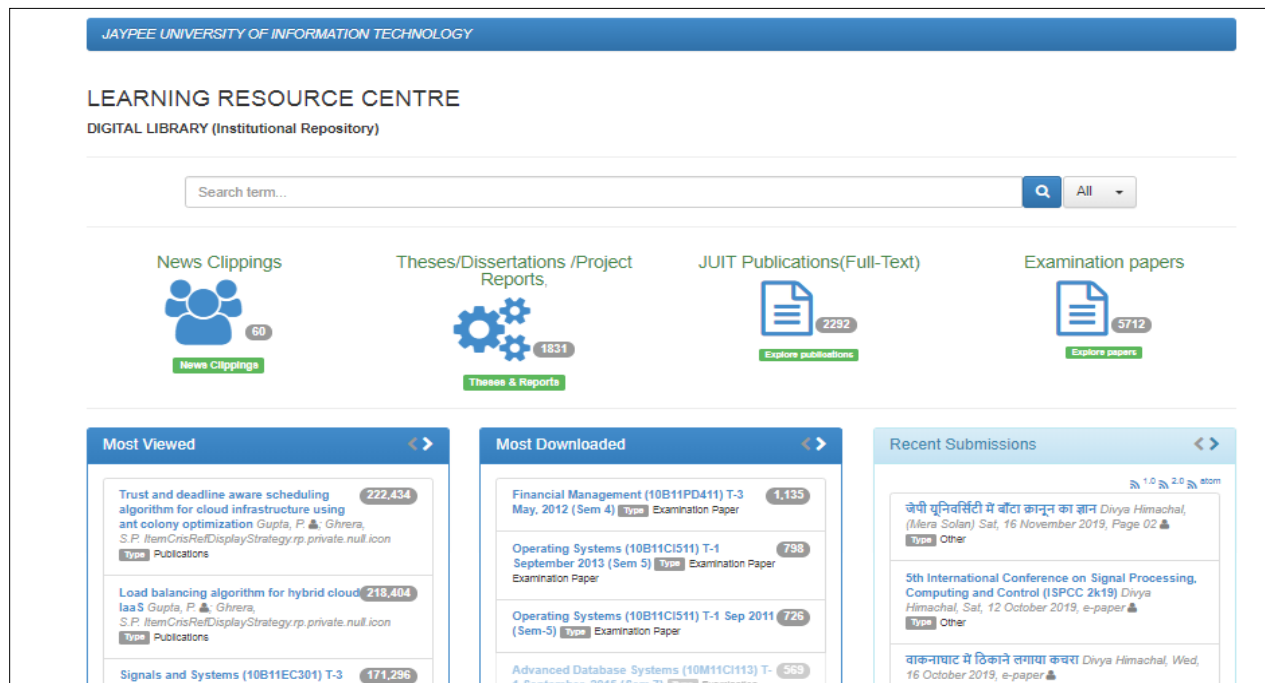
Varatharajan and Chandrashekara (2007) shared that Carnegie Mellon university, International Institute of Information Technology, Hyderabad, Indian Institute of Science (IISc) Bangalore and various other institutions collectively started a project called Digital Library of India. The Department of Culture, Government of India had started a digitization project under the name ‘National Mission for Manuscripts’ in 2003. The project Traditional Knowledge Digital Library (TKDL) was also started in 2001 in collaboration with the Council of Scientific and Industrial Research (CSIR) and Ministry of AYUSH. The National Digital Library (NDL) of India was started in the year 2016 under the execution of IIT Kharagpur and launched in 2018 for the use of Nation. NDL is broadly an interface of exploring Indian repositories.

#### Digital Library at Jaypee University of Information Technology (DL@JUIT):

The Learning Resource Centre of Jaypee University of Information Technology had created a Digital Library (<http://www.ir.juit.ac.in:8080/jspui/>) on Dspace open source software in the year 2009. Initially, it was used for hosting soft copies of old question papers for the use of students. Gradually, full-texts of theses and project reports of students were also uploaded for access over Intranet in the year 2011.

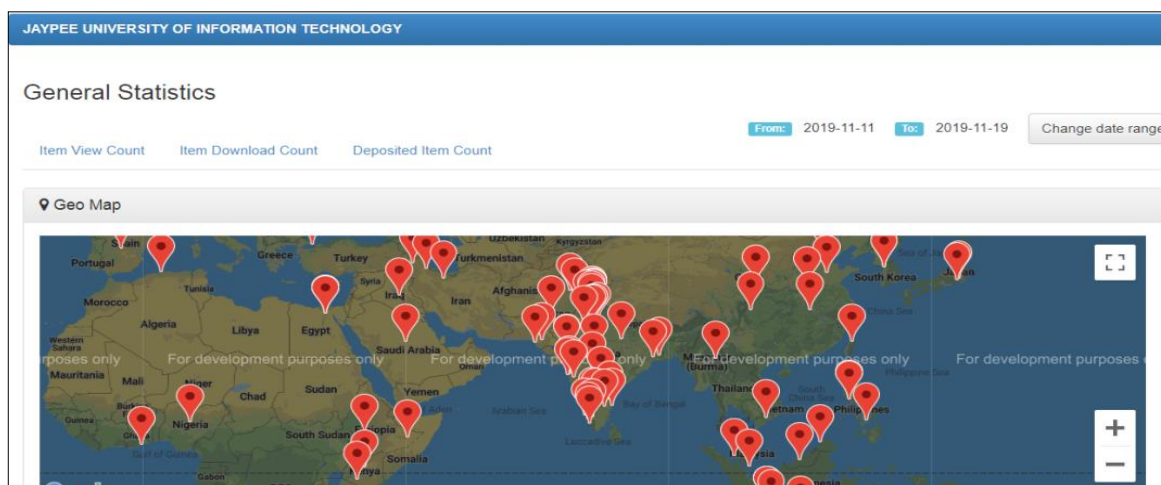
In the year 2016, the digital library developed as an institutional repository of the university. Currently it accommodates news clippings (about JUIT), theses, dissertation/project reports, annual reports, book chapters, research publications and previous years question papers. Altogether, it is hosting nearly 10000 documents which are frequently being used by the users. The library of the university has been also taking an active part in National Digital Library (NDL) of India and sharing over 1500 key documents for use of public over the Internet.

The digital library has user friendly interface. One can search and browse documents directly from the homepage without any confusion.



**Image 1 – Interface of Digital Library @ JUIT**

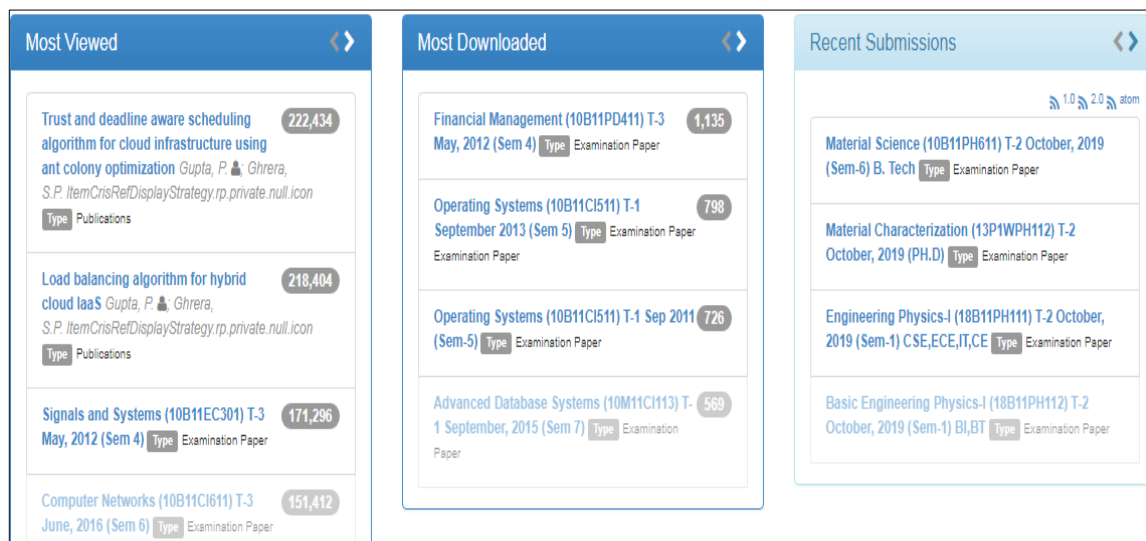
As indicated in Image -2, the digital library also embedded with counting usage counts of documents mounted in the digital library. It provides usage statistics of the collection with the help of Geo map, image formats (PNG or JPEG), and counts against each documents in MS-Excel or CSV formats.



**Image 2 – Usage statistics (view counts/download counts) of Digital Library @ JUIT**

The documents that achieved most number of download and most number of views from the users are highlighted at the homepage of the digital library. It helps in extending a kind of appreciation to the work.





**Image 3 – Most viewed and most downloaded documents**

The digital library also provides provision to create author profiles. The authors of respective documents can create their profiles. The author profile also has facility to link Scopus author ID, Orcid profile ID and Researcher ID in the author profile of digital library.

### Conclusion:

Technology has integrated part in any academic institutions; libraries are mostly influenced and impacted by it. Digital libraries can save the time of users and provide facility to get his/her needed information from anywhere anytime round the clock. Therefore, it becomes essential to plan carefully while developing any digital library. Today we do consider digital library as a component of traditional library but in due course of time traditional libraries would be considered as a component of digital library. Traditional libraries put prominence on user's expectations similarity digital libraries do extend services by which are required by the end user. Earlier users were visiting to the libraries but now time has come that libraries need to reach to the end user. Free flow of information is one of the core objectives of digital library in any academic institute. Librarians should educate users about availability and accessibility of digital resources. India has many initiatives with respect to digital library

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